

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2 2022/2023 (TERM ID 2220)

BMR3174 – SUPPLY CHAIN MANAGEMENT
(All Sections/Groups)

4TH JULY 2023
2.30 p.m - 4.30 p.m
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This Question paper consists of 10 pages with 2 Sections only.
2. **Section A:** Answer all **TWO (2)** questions.
Section B: Answer any **TWO (2)** of the **THREE (3)** questions.
3. The distribution of the marks for each question is given at the end of each question.
4. Please write all your answers in the Answer Booklet provided.

SECTION A: ANSWER ALL TWO QUESTIONS**QUESTION 1**

MMU has three branches located in Cyberjaya, Melaka and Nusantara. Students are often need to travel to three assigned facilities located Faculty A, Faculty B and Faculty C. Management wishes to develop a distribution schedule that will meet the seat demands and the destinations. The transportation cost per student from each of the sources to each of the destinations is shown in the following table.

Capacity (Location)	Monthly Capacity
Cyberjaya	120
Melaka	200
Nusantara	160

Demand (Faculty)	Monthly Demand
Faculty A	140
Faculty B	160
Faculty C	180

Cost (RM) to transport a student from locations to faculties

	Faculty A (RM)	Faculty B (RM)	Faculty C (RM)
Cyberjaya	20.00	16.00	19.00
Melaka	12.00	10.00	13.00
Nusantara	18.00	12.00	22.00

The available seats for transportations are 120 from Cyberjaya, 200 from Melaka and 160 from Nusantara. Faculty A can accommodate 140 students, Faculty B can occupy 160 students and Faculty C can take 180 students. How many students should be scheduled from each source to each destination if the management wishes to apply

- Northwest Corner Rules and its transportation cost. (5 marks)
- Intuitive Lowest Cost and its transportation cost. (5 marks)
- Extending from b), use stepping Stone Method for Optimisation and its transportation cost. Students are required to show all the workings leading to cost optimisation, i.e. improvement index and improved matrix. (15 marks)

[Total: 25 marks]

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QUESTION 2

A project has the following activities, times and precedence relationships.

Activity	Normal Time (Days)	Crash Time (Days)	Normal Cost (RM)	Crash Cost (RM)	Immediate Predecessor (s)
A	3	2	600	600	None
B	6	4	1200	1200	None
C	5	2	1200	2400	None
D	4	3	1200	1800	A
E	7	6	1600	1800	A, B
F	7	4	1200	3000	C
G	5	1	2400	4600	D, E
H	5	1	1200	2700	E, F, G

- Draw a precedence diagram for the project. How many days are required to complete the project?
(5 marks)
 - Compute the earliest start times, earliest finish times, latest start times, latest finish times and slack times. Write these values in the precedence diagram.
(10 marks)
 - Crash the project to 14 days at the least cost and estimate the project cost.
(5 marks)
 - Crash the project to lowest possible days and estimate the project cost.
(5 marks)
- [Total: 25 marks]

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SECTION B: ANSWER ANY TWO (2) QUESTIONS**QUESTION 3**

Mr Kitchen, has a new kitchen operation floor under consideration for workers' movement and cooking related matters. You have been asked to evaluate the operation layout based on the information given. There are **SIX (6)** workstations (**Table 3.1**) and the number of trips as below:

Table 3.1: Number of trips between workstations

To From	Servicing Counter (CS)	Order status (OS)	Preparing new order (PO)	Retrieving order (RO)	Preparing food (PF)	Serve food (SF)
CS	-					
PT	33	-				
KI	24	52	-			
RF	23	15	17	-		
PF	21	65	28	25	-	
VF	20	15	35	13	42	-

The Existing Layout is arranged as per Figure 3.1 and each area is labelled in alphabetic order (A, C, D, F, G, H, I, J).

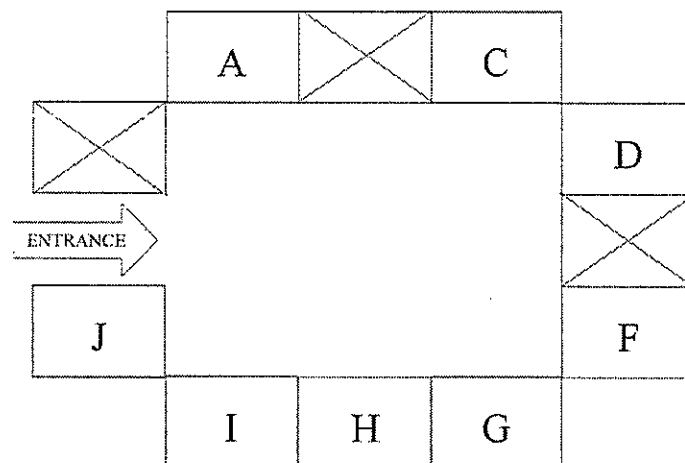
**Figure 3.1****Continued ...**

Table 3.2: Distance Between the Figure 3.1's Layout Areas (meters)

	A	C	D	F	G	H	I	J
A	0							
C	15	0						
D	20	10	0					
F	30	20	15	0				
G	30	25	20	10	0			
H	25	30	25	15	10	0		
I	20	35	30	20	15	10	0	
J	20	35	40	35	20	15	10	0

- a) Based on the existing layout (Figure 3.1), propose the best arrangement for the **SIX (6)** workstations. Students are required to follow the layout of Figure 3.1 and fit each workstation into a suitable area. **Redraw** the Figure 3.1 onto the answer booklet and insert the suggested workstations into the Figure 3.1.

(10 marks)

- b) Based on the output of a), calculate the total weighted distance score. The total load-distance of the new arrangement should not exceed 9000.

(15 marks)

[Total: 25 marks]

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QUESTION 4

A bicycle manufacturer tries to plan ahead in order to effectively address the demand that is projected of its products. Currently the manufacturer is engaging 16 workers. A worker can produce an average of 100 regular production units per month. The manufacturer operates at 180 regular hours per month. Payroll costs are RM 1,600 per worker for regular production units per month.

To avoid variation in supply, the manufacturer has ordered finished products from competing manufacturers. The aggregate demand and expected arrival of finished products for the next six months are as follows

Forecast Aggregate Demand						
Month	Jan	February	March	April	May	June
Demand	1,800	1,600	1,100	900	1,200	2,200
In coming finished products	220	80	150	90	160	100

** Incoming finished products to be added in the planning as opening stock of the month

Operating Cost	
Previous quarter's output	1600 units
Beginning inventory	200 units
Stockout cost	RM 100 per unit
Inventory holding cost	RM 10 per unit at end of month
Hiring workers	RM 800 per worker
Firing workers	RM 320 per worker
Unit cost (Material)	RM 30 per unit (regardless of regular or overtime production units)
Overtime Cost	RM 22.5 per unit (Overtime is limited to the maximum 20% of regular production units. No change in production rate per unit regardless of regular time and overtime)

Evaluate the various production plans that will meet monthly demand. Determine which plan minimizes total costs?

- Plan A - Chase Strategy – Hiring and Firing. No stockout, subcontracting or negative inventory. Workers are not permitted to work beyond regular hour.
(12 marks)
- Plan B – Level Strategy at 12 workers and permit overtime when is necessary. The warehouse now constraints the maximum allowable inventory on hand at the end of each month to 800 units or less. Stockout option is permitted where is necessary.
(13 marks)

[Total: 25 marks]

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QUESTION 5

MRCB has two finished products, A and Z. The product structure tree for both products are illustrated as below:

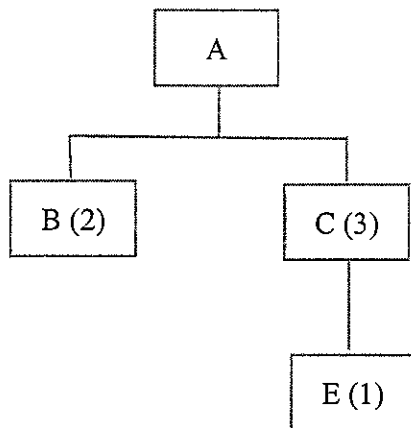


Figure 5.1: Product Structure for Product A

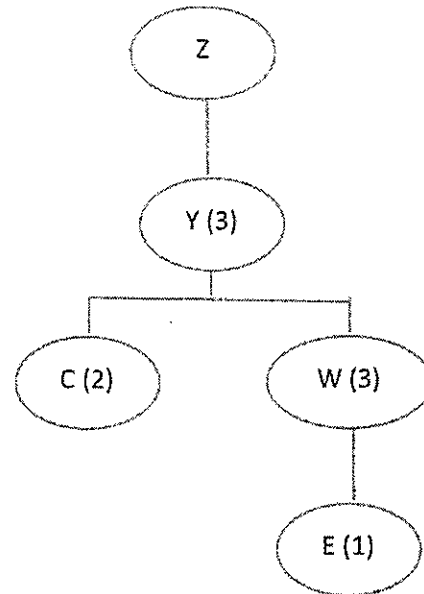


Figure 5.2: Product Structure for Product Z

Table 5.1: Forecast demand and Booked orders for Item A

Week	1	2	3	4	5	6	7	8
Forecast demand (unit)	0	25	10	0	20	50	0	70
Booked orders (unit)	0	15	10	0	40	20	0	60

Table 5.2: Forecast demand and Booked orders for Item Z

Week	1	2	3	4	5	6	7	8
Forecast demand (unit)	90	0	20	30	15	35	0	0
Booked orders (unit)	80	0	10	20	10	45	0	0

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Table 5.3: Inventory Record Data

Description	Product		Part				
	A	Z	B	C	E	Y	W
Lot Sizing Rule	FOQ = 35	FOQ = 50	FOQ = 300	POQ = 2	L4L	FOQ = 200	POQ = 4
Lead Time (wk)	1	2	1	1	2	1	1
Scheduled Receipts	None	None	None	Wk 2 = 650	None	Wk 1 = 200	None
Beginning Inventory	86	50	75	10	30	120	40

The forecast demand, booked orders and product structures for Item A and Z are provided in Figures 5.1 and 5.2, and Tables 5.1, 5.2 and 5.3. The inventory data indicated different order requirements for each product and part. (Students are required to apply the Table A and B provided in the question booklet, and to attach them together with the answer booklet for submission).

Plan the following:

- Complete the Master Production Schedule for Item A and Z (MPS) (12 marks)
- Suppose a customer in Kuala Lumpur calls and says he is facing a shortage of A. It needs 40 units as soon as possible. Assuming you can make no changes to the MPS quantities or order booked, how quickly can it get the customer 40 units? Specify the quantities you can deliver and when. (3 marks)
- Complete the Material Requirement Planning for Part W. (5 marks)
- Complete the Material Requirement Planning for Part C. (5 marks)

[Total: 25 marks]

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Table A: Master Production Schedule for Item

Lot size:	Week											
Lead Time:												
Forecast												
Customer Orders												
Stock On hand:												
MPS quantity												
MPS start												
Available to promise (ATP)												

Table A: Master Production Schedule for Item

Lot size:	Week											
Lead Time:												
Forecast												
Customer Orders												
Stock On hand:												
MPS quantity												
MPS start												
Available to promise (ATP)												

Table A: Master Production Schedule for Item

Lot size:	Week											
Lead Time:												
Forecast												
Customer Orders												
Stock On hand:												
MPS quantity												
MPS start												
Available to promise (ATP)												

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Table B: Material Requirement Planning for _____

Lot Size:	Week											
Lead Time:												
Gross requirements												
Scheduled receipts												
On hand inventory												
Planned order receipts												
Planned order releases												

Table B: Material Requirement Planning for _____

Lot Size:	Week											
Lead Time:												
Gross requirements												
Scheduled receipts												
On hand inventory												
Planned order receipts												
Planned order releases												

Table B: Material Requirement Planning for _____

Lot Size:	Week											
Lead Time:												
Gross requirements												
Scheduled receipts												
On hand inventory												
Planned order receipts												
Planned order releases												

Continued...

Table B: Material Requirement Planning for _____

Lot Size:	Week											
Lead Time:												
Gross requirements												
Scheduled receipts												
On hand inventory												
Planned order receipts												
Planned order releases												

Table B: Material Requirement Planning for _____

Lot Size:	Week											
Lead Time:												
Gross requirements												
Scheduled receipts												
On hand inventory												
Planned order receipts												
Planned order releases												

Table B: Material Requirement Planning for _____

Lot Size:	Week											
Lead Time:												
Gross requirements												
Scheduled receipts												
On hand inventory												
Planned order receipts												
Planned order releases												

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